

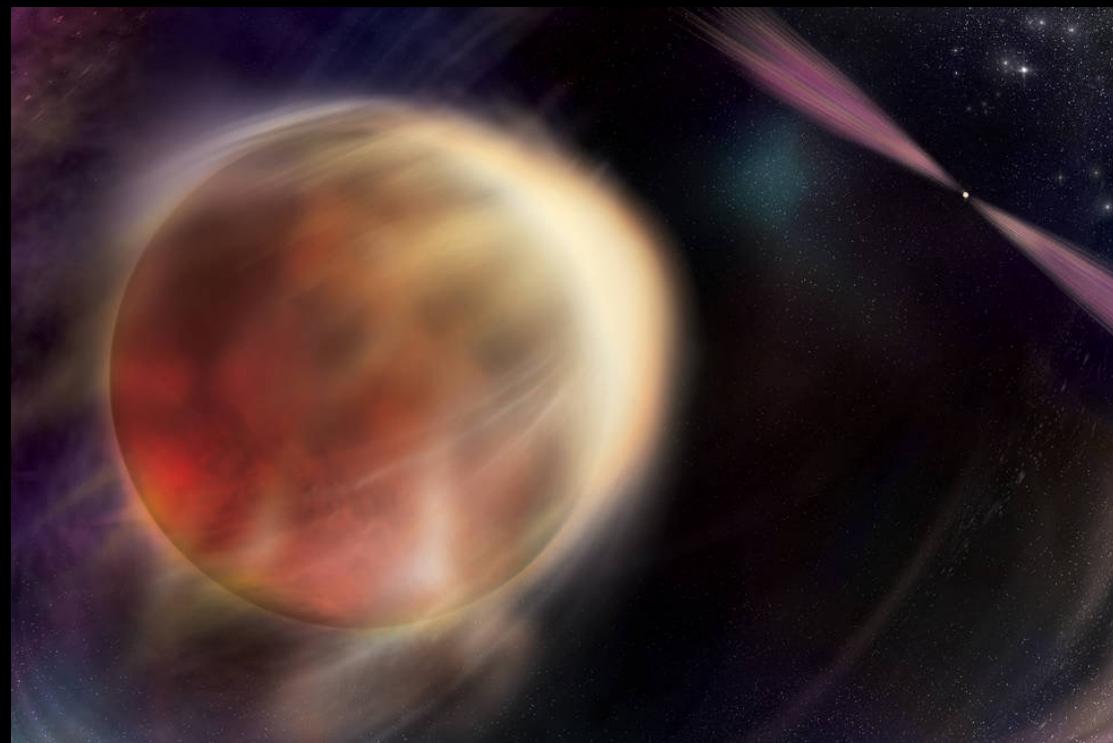
Fermi Detects First Gamma-Ray Eclipses From 'Spider' Star Systems



Scientists discovered the first gamma-ray eclipses from a special type of binary star system using NASA's Fermi Gamma-ray Space Telescope. These so-called spider systems each contain a pulsar – the superdense, rapidly rotating remains of a star that exploded in a supernova – that slowly erodes its companion.

An international team scoured over a decade of Fermi observations to find seven spiders that undergo these eclipses, which occur when the low-mass companion star passes in front of the pulsar from our point of view. The data allowed them to calculate how the systems tilt relative to our line of sight, the stars' velocities, and the pulsar's mass. Pulsars contain the densest matter we can measure, so learning their masses helps probe extreme physics that can't be replicated on Earth.

Before Fermi, scientists only knew about a handful of gamma-ray emitting pulsars. After more than 10 years in space, the mission has identified over 300. Its long, nearly uninterrupted data set allows the community to do trailblazing science like this. Goddard developed and manages the mission.



An orbiting star begins to eclipse its partner, a pulsar, in this illustration. The pulsar emits multiwavelength beams of light that rotate in and out of view and produces outflows that heat the star's facing side, blowing away material and eroding its partner.

Press release: <https://www.nasa.gov/feature/goddard/2023/nasa-s-fermi-detects-first-gamma-ray-eclipses-from-spider-star-systems>

Paper: <https://www.nature.com/articles/s41550-022-01874-x>